S. HRG. 101-1136

STRATEGIC AND CRITICAL MINERALS ACT OF 1990

HEARING

BEFORE THE

SUBCOMMITTEE ON MINERAL RESOURCES
DEVELOPMENT AND PRODUCTION

OF THE

COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

ON

H.R. 4111

TO AMEND THE MINING AND MINERAL RESOURCES RESEARCH INSTITUTE ACT OF 1984, AND FOR OTHER PURPOSES

SEPTEMBER 21, 1990

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Committee on Energy and Natural Resources

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STRATEGIC AND CRITICAL MINERALS ACT OF 1990

FRIDAY, SEPTEMBER 21, 1990

U.S. SENATE,
SUBCOMMITTEE ON MINERAL RESOURCES
DEVELOPMENT AND PRODUCTION,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:37 a.m., in room 317, Dirksen Senate Office Building, Hon. Jeff Bingaman, presiding.

OPENING STATEMENT OF HON. JEFF BINGAMAN, U.S. SENATOR FROM NEW MEXICO

Senator BINGAMAN. This morning, we are holding a hearing of the subcommittee on H.R. 4111, the Strategic and Critical Minerals Act of 1990. H.R. 4111 was introduced by Congressman Craig and passed the House of Representatives on July 10.

The legislation directs the Secretary of Interior to establish a Strategic Resources Mineral Technology Center for the purpose of improving and developing technologies to decrease U.S. dependence on strategic and critical minerals.

This morning, we will hear testimony first from the Department of Interior and then from the university representatives on the merits of the legislation. As usual, I will ask that the witnesses summarize their statements. We will include the full statements in the record and we will leave the hearing open for 2 weeks for any additional comments.

[The text of H.R. 4111 follows:]

101ST CONGRESS
2D SESSION

H. R. 4111

IN THE SENATE OF THE UNITED STATES

JULY 11 (legislative day, JULY 10), 1990
Received; read twice and referred to the Committee on Energy and Natural Resources

AN ACT

To amend the Mining and Mineral Resources Research Institute Act of 1984, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Strategic and Critical Minerals Act of 1990".

SEC. 2. ESTABLISHMENT OF GENERIC CENTER.

The Mining and Mineral Resources Research Institute Act of 1984 (30 U.S.C. 1221 and following) is amended by adding the following new section at the end thereof:

"SEC. 12. STRATEGIC RESOURCES GENERIC MINERAL TECHNOLOGY CENTER.

"(a) ESTABLISHMENT.—The Secretary of the Interior is authorized and directed to establish a Strategic Resources Mineral Technology Center (hereinafter referred to as the 'center') for the purpose of improving existing, and developing new, technologies that will decrease the dependence of the United States on supplies of strategic and critical minerals.

"(b) FUNCTIONS.—The center shall—

"(1) provide for studies and technology development in the areas of mineral extraction and refining processes, product substitution and conservation of mineral resources through recycling and advanced processing and fabrication methods;

"(2) identify new deposits of strategic and critical mineral resources; and

"(3) facilitate the transfer of information, studies, and technologies developed by the center to the private sector.

"(c) CRITERIA.—The Secretary shall establish the center referred to in subsection (a) at a university that—

"(1) does not currently host a generic mineral technology center;

"(2) has established advanced degree programs in geology and geological engineering, and metallurgical and mining engineering;

"(3) has expertise in materials and advanced processing research; and

"(4) is located west of the 100th meridian.

"(d) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated such sums as may be necessary to carry out this section.".

Passed the House of Representatives July 10, 1990.

Attest: DONNALD K. ANDERSON,

Clerk.

Senator BINGAMAN. Our first witness is Dr. Harlan Watson, who is the Principal Deputy Assistant Secretary for Water and Science in the Office of the Science Advisor to the Secretary in the Department of the Interior. Dr. Watson, I gather you are to be accompanied by Dr. John Morgan, Chief Staff Officer. Before you start, let me just defer to Senator McClure and then Senator Ford for any statements they have.

STATEMENT OF HON. JAMES A. McCLURE, U.S. SENATOR FROM IDAHO

Senator MCCLURE. Mr. Chairman, I would ask unanimous consent that my opening remarks be placed in the record in full.

Senator BINGAMAN. We will include them in the record.

[The prepared statement of Senator McClure follows:]

PREPARED STATEMENT OF HON. JAMES A. MCCLURE, U.S. SENATOR FROM IDAHO

I would like to begin my statement this morning by thanking Senator Bingaman for scheduling this hearing on H.R. 4111, the Strategic and Critical Minerals Act of 1990. I am hopeful that we will be able to complete consideration of this measure prior to adjournment of the 101st Congress.

H.R. 4111 directs the Secretary of the Interior to establish a Strategic Resources Generic Mineral Technology Center to conduct research on improving existing and developing new technologies that would decrease the dependence of the United States on foreign sources of strategic and critical minerals. I have made it clear over the years that I believe this is a vital mission. While the world may have changed dramatically over the last twelve months, we must not lose sight of the continuing vulnerability of this nation with respect to strategic and critical minerals. While I understand that some research in this area is currently underway, it is my view that the establishment of a new generic center focused specifically on this mission would be extremely valuable. Our economic and national security interests depend on an adequate and secure supply of strategic and critical minerals and our research efforts should be aimed accordingly.

I am pleased to welcome Dr. Robert Bartlett, Dean of the College of Mines and Earth Resources at the University of Idaho, to the Subcommittee this morning. I look forward to his testimony and the statements of the other witnesses.

Senator MCCLURE. If we have anybody at the press table who is listening I would try to make a point or two about strategic and critical materials, but since we have got the choir here this morning and we are talking to each other I will not take that time.

Senator BINGAMAN. Thank you very much.

Senator Ford.

STATEMENT OF HON. WENDELL H. FORD, U.S. SENATOR FROM KENTUCKY

Senator FORD. It is like the fellow said. You could give us some of it. You would not have to give us all of it this morning, Jim.

This goes back to the surface mining legislation, if you recall, and Cliff Hanson and I found that the definition of one of these mineral institutes was so many Ph.D.'s in engineering and all that kind of stuff. It wound up there were only going to be two schools in this country, and they were defined so they could qualify. We were able to change the definition of it so States like Wyoming and New Mexico and Idaho and Kentucky would have an opportunity.

I have been watching this sort of thing for a long time, and I am pleased that you are holding this hearing this morning, Mr. Chairman, and I look forward to the testimony of our witnesses today. I thank you for the opportunity.

Senator BINGAMAN. All right.

Dr. Watson, why do you not go right ahead.

STATEMENT OF DR. HARLAN L. WATSON, PRINCIPAL DEPUTY ASSISTANT SECRETARY—WATER AND SCIENCE AND SCIENCE ADVISOR TO THE SECRETARY, DEPARTMENT OF THE INTERIOR, ACCOMPANIED BY DR. JOHN D. MORGAN, CHIEF STAFF OFFICER, BUREAU OF MINES

Dr. WATSON. Thank you, Mr. Chairman and members of the subcommittee. Again, I want to thank you for the opportunity to present the administration's views on H.R. 4111, the Strategic and Critical Minerals Act of 1990.

Mr. Chairman, as you stated earlier, the bill would amend the Mining and Mineral Resources Research Institute Act of 1984 to authorize and direct the Secretary of the Interior to establish a Strategic Resources Mineral Technology Center for the purpose of decreasing the dependence of the United States on supplies of strategic and critical minerals.

The belief expressed by the authors of H.R. 4111 that new and improved technologies in the minerals area are essential has long been recognized under the authority of existing statutes.

The administration has requested $4 million in fiscal year 1991 for all university research grants to be competitively awarded through generic mineral technology centers under the Mineral Institute Program of the Bureau of Mines.

While the existing generic center structure provides for research on strategic and critical minerals, the establishment of a new generic center may be worth exploring. Consequently, within the fiscal limitations of the fiscal year 1991 budget request, the administration does not object to the bill as introduced in the House of Representatives.

However, we do have concerns on changes made to the bill during its consideration by the House. Specifically, H.R. 4111 was amended to establish four criteria for the selection of the host university for this new generic mineral technology center that are fundamentally different from the competitive grant selection process under which the system has always operated.

Such criteria in the amended bill specify that the host university (1) does not currently host a center; (2) has established advanced degree programs in geology and geological engineering, and metallurgical and mining engineering; (3) has expertise in materials and advanced processing research; and (4) is located west of the 100th meridian.

While qualified universities for the competitive grants may also meet these four criteria, we do not believe competition for any grant funds is enhanced by geographic limitations, or the other three criteria. The competitive grant process should be encouraged and universally applied within the existing center structure consistent with current practices to avoid research duplication.

We will be happy to work with the committee in adopting changes needed in this bill in order to promote competitiveness and flexibility in the awarding of research grants.

Mr. Chairman, that does conclude my prepared statement. I will be happy to respond to any questions at this time.

Senator BINGAMAN. Dr. Morgan, did you have any prepared statement?

Dr. MORGAN. No, sir. We agree thoroughly with what is said here.

Senator BINGAMAN. Let me just ask a question.

Dr. Lattman in his testimony which will be given shortly, indicates that he is of the view that the subject of critical strategic minerals is sufficiently broad and complex that it is far beyond the capability of any single university, and that although it would be appropriate to go forward, he thinks that a single university needs to lead or coordinate the effort, but clearly a consortium of universities is required to do this work.

What is your view on that, and your view as to whether some alteration in the bill to accomplish that is appropriate?

Dr. WATSON. I might mention and ask Dr. Morgan for additional comments, that our current generic Mineral Institute structure, essentially adopts the practice that Dr. Lattman has referred to. There is essentially a lead center designated. However, the universities do submit to the centers proposal to cover the areas of expertise that the center is conducting. So essentially you do have a lead university and then you generally have, typically five to six universities that participate in the programs of the lead center. We would expect that that would certainly be the practice that we would follow, if indeed the new center is established.

Dr. Morgan, did you want to comment?

Dr. MORGAN. That is essentially correct. We have six generic centers, and each one has several affiliates, some of which may change year to year, depending on their technical competence and whether people come or go, or a new emphasis, but clearly more is brought to the table when you have a consortium of several universities rather than just one.

Senator BINGAMAN. You would expect, if this legislation became law, that is how it would be administered?

Dr. MORGAN. Yes, sir. If this legislation became law, we would issue a call for proposals from any qualified university, and in screening those proposals, the degree to which they brought in other qualified universities would be a factor in deciding who got the final award.

Senator BINGAMAN. So if a school did not seek out and solicit the involvement of other qualified universities, its chance of prevailing in the competition would be less?

Dr. MORGAN. That is correct, sir. We have always looked for that. For example, our Generic Center on Mine Systems includes Alaska, because of the frozen north, and Alabama because of the coal in the south, and so on. They cover several different areas and permit professors and others to test results in different places.

Senator BINGAMAN. Senator McClure.

Senator MCCLURE. There is no one to listen to us, but there is a record to be made, and hopefully somebody who is not here to listen will read the record. There is a great lack of understanding in this country about the critical nature of our dependence upon

minerals that are essential to modern industrial processes, is that not correct, Dr. Watson?

Dr. WATSON. Yes sir, that is correct.

Senator MCCLURE. One of the efforts that we have made over the last several years is to focus on that critical need for this country. That has not changed just because the cold war seems to be, hopefully, at an end. We still find ourselves dependent upon imported materials for essential processes, and if I recall the list now, it is still about as it was: about one half of all of the critical materials we are from 65 to 100 percent dependent upon imports, is that not correct?

Dr. WATSON. That is correct, sir.

Senator MCCLURE. Now, there are a few people that believe that since there are biblical references to King Solomon's gold mines and there is an extensive history of mining throughout the world over all of recorded history, that surely we do not need to learn anything more about it. Is that a valid perspective?

Dr. WATSON. No, obviously not.

Senator MCCLURE. What are we learning? What do these institutes, and what does research lead us toward? Why is it of critical interest to us, other than the fact that we import so much of our critical materials?

Dr. WATSON. Obviously, we do have dependence, as you said, from anywhere from 65 to 100 percent, depending upon the specific mineral, upon imports. We are continuously looking for substitutes to these, and we are particularly dependent upon areas of the world—South Africa, Zaire, and the Soviet Union—which have less than stable governments, and of course any disruption of these supplies could have a very negative impact upon our economy.

One of the things, of course, we are continually looking for, is the research upon substitutes for critical minerals, as well as trying to develop new and improved processing technologies. We are continually on the lookout for deposits in this country of these minerals. However, because typically we have such low-grade ores, it is just not economically feasible to develop them in most cases, so we are continually looking for methods of exploration technologies, processing technologies and so on, so that we can economically develop these minerals in our own country, so we are not dependent upon these imports.

Senator MCCLURE. The Senators present do not need to be told, but I think occasionally we do need to say to a wider audience that indeed, mining is changing. It is not the same today as it was 20 years ago. A lot of the processes and technologies used have been developed or improved in the last several years in their application, and that process continues.

I am afraid mining is an industry somewhat distant from the majority of the citizens. They do not see it. They do not feel it. They are not directly affected by it. They do not understand it. They do not know much about it. People go out and dig in the ground and they bring something out and we use it, but they have no perception at all for either the processes used, the complexity of those processes and the more highly technically sophisticated those processes become.

That is the reason why this subcommittee has supported the mineral institutes over the years, and as Senator Ford said earlier, the effort that we made to broaden the perspective and get more people involved, and I think that has been valuable.

If I understand correctly from Senator Bingaman's questions and from the testimony filed here today, there is a growing awareness of the fact that diffused and dispersed research, by itself, creates some gaps, or does not fill some of the gaps, and that there is perhaps a need to bring it together in a more directed way. Not to deprive the dispersion, but to create a greater degree of coordination and direction of the overall program, is that not correct?

Dr. WATSON. Yes, sir.

Senator MCCLURE. I thank you very much, and I cannot close this without saying to Dr. Morgan, as I have had the opportunity to say before, what a tremendous respect the Bureau of Mines has among those people who know anything about the Bureau of Mines.

There have been efforts made to get it out of its focused professionalism. Fortunately, that is not the case these days, and the Bureau of Mines is allowed to be a professional organization, as indeed they should be, and they are regarded throughout the industry, and I think throughout the world, as objective, dependable scientists and professionals directed toward the mineral extraction in this country.

The result of that is, of course, with that credibility there is a greater willingness of the people in the private sector to share information with the Bureau of Mines in a way that would never occur otherwise, and that was at an earlier time threatened, as there was an attempt made to change the direction of the bureau.

It is a fine organization. I have great respect for the people that are in it, and I very much appreciate your testimony today.

Thank you, Mr. Chairman.

Senator BINGAMAN. Thank you very much.

Senator Ford.

Senator FORD. Since our distinguished friend decided to go back into private industry and make a lot of money, we will try to see that those of us who are able to stay around awhile that you continue in your professional posture and defend you—well, not that far, but almost.

If you had your way, Dr. Watson, and we authorized this additional institute, how would you prefer to select the university that would be the lead research—what would be your criteria? You do not turn it over to the good old boy network, do you, like we have on other research, and no university gets it except about ten?

Dr. WATSON. No sir, we do not. We do have an established set of criteria, and I will defer to Dr. Morgan for the details, which we would use.

Senator FORD. You would do it yourself? It would not be handed off to another group of people?

Dr. WATSON. It essentially would be done by the Bureau of Mines.

Senator FORD. That suits me fine.

Dr. WATSON. Any details Dr. Morgan he can provide for you.

Senator FORD. That would be fine.

Now, I know you are concerned about west of the 100th meridian, but that is I believe what we used to divide east and west as it related to surface mining, and the type of coal and extraction east and the type of coal and extraction west. What is wrong with using the 100th meridian? Give that to me again.

Dr. WATSON. The basic issue is that it does cut down on the number of universities which would qualify. That is the basic issue.

Senator FORD. Basically, the minerals you are looking for are west of the 100th meridian?

Dr. WATSON. That is true. They are typically located west of there.

Senator FORD. Would there be more interest if you left it west of the 100th meridian?

Dr. WATSON. I believe that would be the case, yes.

Senator FORD. Staff just tells me the lead institute is west. Others could be east, and that is basically what has happened in the past.

Dr. WATSON. That is correct. If you did establish this as a lead university, I would expect that it would have affiliates, and those can be located, of course, in any part of the country.

Senator FORD. You are looking for a proposal that would be basically a consortium?

Dr. WATSON. Yes.

Senator FORD. Thank you, Mr. Chairman.

Senator BINGAMAN. Thank you.

Let me ask one other question. Where does the 100th meridian run? Who are we fencing in, and who are we fencing out?

Dr. WATSON. Colorado, Kansas, I am told. So it runs down through Texas, up through North Dakota.

Senator BINGAMAN. We thank you very much for your testimony, both of you.

There are two other witnesses, and I will ask them to come forward together and testify as a panel, and I apologize to both of them that I have another hearing here in just a very few minutes that I have to duck out to.

Dr. Laurence Lattman, who is the president of the New Mexico Institute of Mining and Technology and does a wonderful job in that position. I can vouch for that, having worked with him for many years now.

Dr. Robert Bartlett, who is the Dean of the College of Mines and Earth Resources at the University of Idaho, who I am sure has stellar qualifications in that position.

We appreciate you being here. Dr. Lattman, why do you not go ahead first?

STATEMENT OF DR. LAURENCE H. LATTMAN, PRESIDENT, NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY

Dr. LATTMAN. Thank you very much, Senator Bingaman, Senator McClure.

Much of what I wanted to say has already been subsumed in the previous testimony. The other generic centers are rather restricted in their scope. They deal with such things as respirable dust, pyro-

metallurgy, comminution, and a single university, or even a small consortium, can focus on that.

What is proposed here is a generic center dealing with the entire range and scope of the extractive industries vis-a-vis strategic and critical minerals—the location, the geology of the deposit, the mining methods, the processing, the extraction—far beyond the scope of a single school, and for this reason a consortium should actually be mentioned in the legislation, even though the bureau has testified that a consortium would have a marked effect on raising the quality of a proposal.

I point out that the Bureau of Mines is quite capable and competent to develop this program, and the real rationale for having universities involved is twofold: (1) they add a research dimension, of course, to what the bureau can do; and (2) they have the advantage of educating the future generation of mining engineers and extractive metallurgists, which the bureau does not do, and if we do not have that future cadre, this is an exercise in futility, and this is where the universities can come in, and a consortium, of course, would involve more students than a single school.

With that in mind, I have made two recommendations concerning the legislation. One is on page 2, line 22, to add before the word "university" in line 22 the adjective either "leading" or "coordinating," thereby indicating that indeed it is the intent of Congress that this be a consortium.

Further, that there be an added criterion, number 5 on page 3, following line 6, which would read: "It is the lead or coordinating university of a consortium of schools which meet all or most of the four above criteria." The reason I said "all or most," is I have some concerns with criterion number 4, the 100th meridian, and "all or most" gives a way to deal with that, I think.

That is my testimony, Senator Bingaman.

[The prepared statement of Dr. Lattman follows:]

PREPARED STATEMENT OF LAURENCE O. LATTMAN, PRESIDENT, NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY, SOCORRO, NM

The reliance of the United States on supplies of certain strategic and critical minerals from sometimes undependable foreign sources is well established. Therefore, the value of the proposed Center is clear.

The following points concerning HR 4111 are made in this presentation:

1. Such a center at a university could help in lessening our dependence on foreign sources.

2. Being at a university or universities would produce students trained in this important area.

3. Many universities have close spacial and cooperative arrangements with state bureaus of mines and mineral industries enhancing the broadness and depth of the approach.

4. No single university could adequately deal with so wide-ranging a subject although one lead or coordinating university should be designated.

Recommendations for changes in the wording of HR 4111 are given at the end of this document.

Amplification:

Point 1. There must be a strong effort to reduce the United States' vulnerability to unreliable sources of strategic and critical minerals, not only for defense reasons, but to support our industry and enhance our international competitiveness. Production of such minerals within the United States, in addition to ensuring reliable supply, would also dampen wide and sudden fluctuations in price.

Points 2 and 3. Many universities, particularly in the western United States, work closely with state bureaus of mines. Thus, a broad-based effort could be mounted. 0f

great importance is the production of students who would not only carry on and extend such work but would bring to mining companies their newly-won expertise.

Most mining schools are in the western United States so that the restriction of being west of the 100th meridian is not severe. Additionally, several of the outstanding schools in the east already are involved in generic centers.

Point 4. The subject of critical and strategic minerals is broad and complex and, I firmly believe, is far beyond the capability of any single university. Without doubt, a single university must lead or coordinate the effort, but equally without doubt, a consortium of universities would be required. The present generic centers deal with narrow areas of research such as comminution and dusting. So large an effort as locating, mining, and processing strategic and critical minerals needs a broad and wide area approach such that only a consortium would have the best chance of making significant contributions. Each state school could naturally be expected to concentrate on minerals in their own state and, thus, a consortium would ensure broad coverage. Because mineral deposits are widely distributed and because different schools have expertise, a consortium would almost be a requirement of the best proposal for a center.

RECOMMENDATIONS

I would, therefore, suggest the addition of the work "leading" or "coordinating" before the word "university" in line 22 of page 2 of the Act.

I would recommend the addition of the following after line 6 on page 3 of the Act:

"(5) is the lead (coordinating) university of a consortium of schools which meet all or most of the four above criteria."

Senator BINGAMAN. Thank you very much. Why do we not go ahead and hear from Dr. Bartlett.

STATEMENT OF DR. ROBERT W. BARTLETT, DEAN, COLLEGE OF MINES AND EARTH RESOURCES, UNIVERSITY OF IDAHO

Dr. BARTLETT. Thank you, Senator Bingaman. Thank you for the invitation from you to testify today in favor of H.R. 4111.

The need to reduce America's vulnerability to interruptions in foreign supplies of strategic and critical materials is amply illustrated by the current crisis in the Persian Gulf, where we are spending $1 billion a month in addition to the regular defense budget of $25 billion a month, and risking the lives of our youth, to secure our vital interests in petroleum.

At some future date, will the United States be willing and able to send a similar military expedition to Southern Africa, or another predominant supply location for strategic and critical minerals? The cost in treasure, blood and diplomatic goodwill in the affected area could be too much for the American people to accept. We must reduce our vulnerability to supply interruptions through less costly options.

H.R. 4111 is a desirable option. It authorizes a generic minerals technology center with sustained research focused on strategic and critical minerals. It would be analogous with the task-oriented generic mineral technology centers already established for respirable dust, mineral wastes, and marine minerals development.

Under the general direction of the Bureau of Mines, the research projects conducted in the proposed center would complement strategic and critical materials research at several Bureau of Mines laboratories and at the Idaho National Engineering Laboratory.

The Office of Technology and Assessment's 1985 report, titled, "Strategic Materials Technologies to Reduce U.S. Vulnerability," identifies the most vulnerable minerals and recommends three

technical approaches to reduce U.S. reliance on uncertain foreign sources:

First, diversify supply. Identify and appraise alternative foreign and domestic deposits, and develop extraction technologies suited to those deposits.

Second, conservation. Decrease demand through more efficient processing, and expand recycling.

Third, develop substitute materials.

The primary objective of the proposed center to be established under H.R. 4111 should be to develop new and improved technologies through a balanced program of research projects in these three areas. My allotted time does not permit expanding on these three areas, but my written testimony contains an addendum with some further thoughts.

The center should also provide technology transfer to industry and foster education of engineers, scientists and mineral economists in fields relevant to strategic and critical materials, a point also made by Dr. Lattman.

I would like to make an additional point, not included in my prepared remarks, about competition. The way the generic centers are currently operated, there is a lead center, there are affiliate centers, but all 32 mineral institutes may submit research proposals to the lead center on whatever topic it is, so there is full competition for individual research projects among all of the 32 mineral institutes.

If the impression has been given that establishing a center, for example, west of the 100th meridian would prevent faculty at the 32 institutes throughout the United States, including those in the east, from participating in this research—if that impression has been given, it is a faulty impression.

I wish to close by thanking Senator Bingaman for the invitation to express my views about H.R. 4111, and I earnestly solicit the support of this subcommittee for its adoption.

Thank you.

[The prepared statement of Dr. Bartlett follows:]

PREPARED STATEMENT OF ROBERT W. BARTLETT, DIRECTOR, IDAHO MINING AND MINERAL RESOURCES RESEARCH INSTITUTE, DEAN, COLLEGE OF MINES AND EARTH RESOURCES, UNIVERSITY OF IDAHO, MOSCOW, ID

The need to reduce America's vulnerability to interruptions in foreign supplies of strategic and critical materials is amply illustrated by the current crisis in the Persian Gulf where we are spending one billion dollars a month, in addition to the regular Defense budget of 25 billion dollars per month, and risking the lives of our youth to secure our vital interests in petroleum.

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—Diversify supply: identify and appraise alternative foreign and domestic deposits and develop extraction technologies suited to those deposits

—Conservation: decrease demand through more efficient processing and expanded recycling

—Develop substitute materials

The primary objective of the center established under H.R. 4111 should be to develop new and improved technologies through a balanced program of research projects in these three areas. My allotted time does not permit expanding on these three areas, but my written testimony contains an addendum with some further thoughts.

The center should also provide technology transfer to industry and foster education of engineers, scientists and mineral economists in fields relevant to strategic and critical materials.

Supporting the most promising research projects—those with better prospects for commercial implementation and high impact on supply vulnerability will require proactive management of the center: identifying and communicating critical needs for research rather than only reacting to submitted research proposals.

The center should emphasize cooperation with government agencies and industry, information dissemination, and accomplishing specific measurable goals.

I wish to close by thanking Senator Bingaman for the invitation to express my views about H.R. 4111, and I earnestly solicit the support of this Subcommittee for its adoption.

ADDENUM

1. Diversification of Supply

Most of the significant domestic deposits of strategic minerals are in the western USA. We have identified 16 relatively large strategic mineral deposits in or near Idaho. There is potential for deep discoveries resulting from data in oil and gas well logs. However, appraisal of domestic strategic mineral deposits should be expanded to all of North America.

Developing extraction technologies that can be implemented with equal advantage by unreliable foreign producers with better ore deposits has no advantage. Research on extraction processes should be restricted to those that provide one or more of the following: (1) differential advantage to a domestic or friendly foreign producer, (2) economic development of known ore deposits in ours or friendly countries that will provide supply diversity, (3) synergistic coupling with other domestic production, (4) utilization of existing domestic by-products and residues, (5) upgrading of domestic substandard materials including obsolescent stockpiles, and (6) incentives to maintain and operate critical North American processing facilities.

2. Conservation

Recycling research–should include (1) chemical and metallurgical separations and refining, (2) economic and geography oriented studies, i.e., collection, sampling, transportation, aggregating, (3) economics and technology of scrap stockpiling and blending (using linear programming), (4) evaluation of modified compositions with relaxed specifications compatible with recycling, (5) on-line identification, sorting, sampling, and economic evaluation of scrap, (6) physical methods of sorting and separating scrap mixtures, and (7) refining processes that match-up with existing primary production processes and infrastructure. With respect to the last item, it is a matter of providing an intermediate product at low processing costs that can be transferred to an existing plant—a very simply concept but almost always ignored by researchers who think their new process must make a final pure product, invariably with numerous steps that turn out to be too expensive.

Advanced processing and fabrication should emphasize processes: (1) with few steps, (2) that waste little material in each step, and (3) that produce few rejects. This leads to near net shape fabricating processes such as powder metallurgy (i.e. with hot isostatic pressing for powder consolidation), and precision casting. Development of alloys powders with the required composition and properties is needed.

3. Substitution

Substitution includes new materials and changing compositions that use less of the strategic material to perform its design function. In order not to duplicate work at the Idaho National Engineering Laboratory, I recommend that substitution re-

search at the proposed center emphasize composition changes, performance evaluation of available substitutes, claddings and coatings. Often, the design function is only needed on the surface of the hardware component and an effective cladding or coating will suffice.

Senator McCLURE [presiding]. Thank you both for your testimony. You have both made thoughtful suggestions and submitted constructive testimony.

I think I can understand both sides of the 100th meridian question, because while some may say you are discriminating against those east of the 100th meridian, the less populated areas of this country sometimes are not equal competitors simply because there is smug condescension among those that may be at larger institutions in larger population centers.

I have seen that more than once, and the highly vaunted peer review process sometimes becomes, as Senator Ford said, an old boy network that excludes the more brash, but smaller institutions that may exist in the less populated areas of the country. I could detail chapter and verse on more than one instance when I think that has occurred and is occurring.

The other side of that is that I think that any really well-competed peer review process in this particular area would recognize those institutions that do have outstanding expertise. This is a particularly well-defined community of scholars and research expertise. I do not think it could possibly run the same problem that others do absent this provision in the bill. With or without it, I think the institutions west of the 100th meridian are well-positioned to compete very well.

I do appreciate the particular questions that you have raised, Dr. Lattman, about the ways in which we might improve this. One way or another, we certainly want the record to reflect the fact that it is the expectation of the committee here, as it has been throughout—we are not dealing with taking all the research in the field and putting it one place and everybody else is out.

That is not the basis of this proposal. That is not the way the Congress would expect it to work. With or without amendments, the record should very clearly reflect that determination.

Dr. Bartlett, you have focused on some areas where we should look, and I think the record has benefited by the suggestions that you have made about the areas of research that should be concentrated upon.

I have a request to include in the record a statement by Christopher Henry of the University of Texas at Austin in support of H.R. 4111, and it will be made a part of the record in full at this point.

[The prepared statement of Mr. Henry follows:]

PREPARED STATEMENT OF CHRISTOPHER D. HENRY, DIRECTOR, TEXAS MINING AND MINERAL RESOURCES RESEARCH INSTITUTE, THE UNIVERSITY OF TEXAS, AUSTIN, TX

I am writing in support of HR 4111 to establish a Generic Mineral Technology Center on Strategic and Critical Minerals. The importance of our strategic mineral resources to the economic competitiveness and well being of the United States warrants a focused program to assure their availability to U.S. industry. Although superpower confrontation appears to be diminishing, the potential for disruption of foreign supplies, for example in southern Africa, remains high. Possibly more significantly, economic competition is increasing dramatically. The ability of the United States to domestically produce strategic minerals and finished products from them is essential to its long-term position of economic strength in the world. An ef-

fective national program should include research and development in mineral exploration, processing, extraction, substitution, conservation, and recycling. My comments focus on the mineral exploration aspects of such a program.

Until recently, the U.S. could rely largely on foreign and, in many cases, third-world producers of raw materials. U.S. companies could economically import the bulk low-cost raw material and process it to produce high-value finished goods. Increasingly, producers of raw materials are recognizing the value of downstream processing of the strategic materials they produce. This trend is leading to increased production and export of finished products, rather than of the low-cost raw material. This increases the cost to users in the U.S., increases our trade imbalance, and generally reduces economic benefit to the U.S.

Additionally, many minerals are becoming increasingly important in the manufacture and production of new advanced materials. These non-traditional strategic minerals, such as beryllium, yttrium, niobium, and rare earth elements, are only now finding major uses based on new technological advancements. However, these and other "high-tech" minerals will play a dramatically increasing role because of their need in the products of the future, including electronics, lasers, magnetics, and optics. The demand and consumption of these minerals will increase substantially in the coming decades.

The nation must continue to assess and evaluate secure future sources of supply of strategic minerals. Mineral exploration is necessary to identify new, unconventional deposits of the more traditional minerals as well as deposits of the newer, high-tech materials. Let me cite examples of each of these needs.

Few conventional occurrences of the traditional strategic minerals exist in the U.S. Advances in processing methods may help make these few exploitable. However, new exploration techniques and strategies are necessary to identify and evaluate unconventional deposits. An example is the potential for platinum-group elements in layered basic intrusions of the U.S. midcontinent. These rocks are similar to those of the Bushveld complex in South Africa, which is one of the world's major sources of platinum-group elements, nickel, chromium, and vanadium. The exploration targets in the U.S. have not been extensively examined because they are deeply buried. Exploration techniques to identify and assess these deep potential resources are needed.

A major beryllium deposit in Texas constitutes an example of a new deposit of one of the specialty, high-tech materials. Because this deposit belongs to a previously unrecognized class of beryllium ore, exploration methods are not available to explore for or identify additional deposits. New concepts on mineralization processes and exploration are necessary to encourage discovery of other such deposits. In turn, identification of these new types of deposits will require new developments in processing and extraction methods.

I was particularly pleased when Congress instructed the National Advisory Committee on Mining and Mineral Resources Research to develop a plan to establish a National Strategic and Critical Minerals Research Center. Unfortunately, the Advisory Committee chose not to forward such a proposal, citing existing but dispersed research programs in extraction technology. However, no existing program addresses the complete spectrum of necessary research in strategic materials, including exploration methods for new or unconventional deposits. Therefore, a more comprehensive approach through establishment of a Strategic and Critical Minerals Research Center that addresses all aspects of exploration and development is feasible and warranted. The value to the United States of such an effort would be immense. Your efforts to accomplish these goals are vital to the economic and national security of the United States.

Senator McClure. If there will be nothing further, the committee will stand adjourned, and thank you.

[Whereupon, at 10:05 a.m., the hearing was adjourned.]

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